

WHAT IS CLAIMED IS:

1        1. A reflective display device, comprising:  
2            a switching layer for switching between a first  
3        state which allows transmission of incident light and a  
4        second state which changes a direction of travel of the  
5        incident light; and

6            reflecting means for reflecting incident light from  
7        the switching layer,

8            wherein said reflecting means is adapted to realize  
9        a black state by reflecting an image of a black part of  
10      an eye of an observer when the switching layer is in the  
11      first state, and as the observer recognizes the image of  
12      the black part of the eye.

1        2. The reflective display device as set forth in  
2        claim 1, wherein a white state is realized when the  
3        switching layer is in the second state.

1        3. A reflective display device, comprising:

2            a switching layer for switching between a  
3        transmissive state for allowing transmission of incident  
4        light and a scattering state for scattering the incident  
5        light; and

6            a retro-reflector as reflecting means,  
7        wherein a pitch of a smallest unit structure of the

8      retro-reflector is larger than 0 mm and not more than 5  
9      mm.

1            4. The reflective display device as set forth in  
2      claim 3, wherein the pitch of the smallest unit structure  
3      of the retro-reflector is larger than 0 mm and not more  
4      than 1 mm.

1            5. A reflective display device, comprising:  
2            a switching layer for switching between a  
3      transmissive state for allowing transmission of incident  
4      light and a scattering state for scattering the incident  
5      light; and  
6            a retro-reflector as reflecting means,  
7            wherein a pitch of smallest unit structures of the  
8      retro-reflector is not more than half a diameter of a  
9      black part of an eye of an observer.

1            6. The reflective display device as set forth in  
2      claim 5, wherein the pitch of the smallest unit structure  
3      of the retro-reflector is not more than a diameter of a  
4      pupil of the observer.

1            7. A reflective display device, comprising:  
2            a switching layer for switching between a

3 transmissive state for allowing transmission of incident  
4 light and a scattering state for scattering the incident  
5 light;

6 color filter sections, which are provided  
7 corresponding one to one to respective pixels; and  
8 a retro-reflector as reflecting means,

9 wherein a pitch of a smallest unit structure of the  
10 retro-reflector is not more than a pitch of the color  
11 filter sections.

1 8. The reflective display device as set forth in  
2 claim 1, wherein said switching layer is a light-  
3 scattering liquid crystal layer.

1 9. The reflective display device as set forth in  
2 claim 1, wherein said reflecting means is in a form of  
3 either one of a corner cube array, a micro sphere array,  
4 and a micro lens array.

1 10. The reflective display device as set forth in  
2 claim 3, wherein light absorbing surface portions are  
3 formed at some of planes of the smallest unit structure  
4 of the retro-reflector.

1 11. The reflective display device as set forth in

2 claim 10, wherein said light absorbing surface portions  
3 are provided in a standing direction with respect to a  
4 surface direction of the switching layer.

1       12. The reflective display device as set forth in  
2 claim 10, wherein said light absorbing surface portions  
3 are provided along borders of the smallest unit  
4 structures of the retro-reflector.

1       13. The reflective display device as set forth in  
2 claim 10, wherein the retro-reflector is in a form of a  
3 corner cube array, and the light absorbing surface  
4 portions are formed so that front end portions thereof  
5 make up a single plane with respect to an imaginary plane  
6 connecting respective vertices of the reflecting means.

1       14. The reflective display device as set forth in  
2 claim 10, wherein said light absorbing surface portions  
3 are made of a photosensitive material which is colored by  
4 irradiation of light.

1       15. The reflective display device as set forth in  
2 claim 10, wherein said retro-reflector is in a form of a  
3 corner cube array, and light absorbing sites are formed  
4 at vertices and sides of the corner cube array.

1        16. The reflective display device as set forth in  
2 claim 1, wherein said reflecting means is in a form of a  
3 corner cube array, and a light shielding section for  
4 shielding reflection of light at vertices and sides of  
5 the corner cube array is provided on the reflecting  
6 means.

1        17. The reflective display device as set forth in  
2 claim 1,

3        wherein:

4        said switching layer includes pixels, and said  
5 device includes a light absorbing section for absorbing  
6 light which passes through different pixels.

1        18. The reflective display device as set forth in  
2 claim 17, wherein said light absorbing section is at  
3 least one of a louver, a color filter section, and a  
4 black matrix section.

1        19. The reflective display device as set forth in  
2 claim 7,

3        wherein:

4        said switching layer includes pixels, and  
5        said smallest unit structure of the retro-reflector

6 is formed so that light having passed through one of the  
7 color filter sections of the respective pixels returns to  
8 this color filter section.

1        20.. The reflective display device as set forth in  
2 claim 7, wherein the pitch of the smallest unit  
3 structures of the retro-reflector is not more than 1/2  
4 the pitch of the color filter sections.

1        21. The reflective display device as set forth in  
2 claim 1, wherein at least one lens sheet is provided in  
3 front of the reflecting means.

1        22. The reflective display device as set forth in  
2 claim 3, wherein a light transmissive resin fills concave  
3 portions of the retro-reflector.

1        23. The reflective display device as set forth in  
2 claim 1, further comprising:

3            a display panel including said switching layer and  
4 said reflecting means; and

5            a light absorbing element which covers a side  
6 surface of the display panel.

1        24. A retro-reflector, comprising:

2        a plurality of adjoining retro-reflecting sections  
3    for reflecting incident light so that an outgoing ray of  
4    the reflected light is substantially parallel to the  
5    incident light,

6        wherein light absorbing surface portions for  
7    absorbing light are provided at borders of the retro-  
8    reflecting sections.

1        25. The retro-reflector as set forth in claim 24,  
2    wherein said light absorbing surface portions are  
3    provided in a standing direction with respect to a  
4    surface direction of the retro-reflecting sections.

1        26. The retro-reflector as set forth in claim 24,  
2    wherein the retro-reflecting sections are in a form of  
3    a corner cube array, and the light absorbing surface  
4    portions are formed so that front end portions thereof  
5    make up a single plane with respect to an imaginary plane  
6    connecting respective vertices of the retro-reflecting  
7    sections.